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THE ORIGIN OF THE TRIGLYPH FRIEZE

Since the days of Vitruvius at least it has been the belief of most of those who have given attention to the matter that the triglyph frieze in Doric architecture arose from construction in wood. On this assumption our histories of architecture well nigh universally maintain that the triglyph represents the sheathed beam end of such primitive buildings, and that the metopes represent filling of what were originally openings through the frieze. I have elsewhere[1] sought to show how insecure is our ground for the belief in open friezes and I now presume to question the accuracy of the belief that the triglyph represents the original beam end.

The source and the chief sponsor of the prevailing theory is Vitruvius, who sets forth his argument for the identification of the triglyphs as beam ends in his *De Architectura*, IV, 2, 4: *non enim quemadmodum nonnulli errantes dixerunt fenestrarum imagines esse triglyphos, ita potest esse, quod in angulis contraque tetrantes columnarum triglyphi constituuntur, quibus in locis omnino non patitur res fenestras fieri. dissolvuntur enim angulorum in aedificiis iuncturae, si in îs fenestrarum fuerint lumina relicta. etiamque ubi nunc triglyphi constituuntur, si ibi luminum spatia fuisse iudicabuntur, isdem rationibus denticuli in ionicis fenestrarum occupavisse loca videbuntur. utraque enim, et inter denticulos et inter triglyphos quae sunt intervalla, metopae nominantur. οπας enim Graeci tignorum cubicula et asserum appellant, uti nostri ea cava columbaria. ita quod inter duas opas est intertignium, id μετοπη est apud eos nominata.* [Krohn.]

This passage is usually accepted with implicit confidence as the final word on the subject. No one, so far as I am aware, has ever seen fit to inquire into the possibility of Vitruvius having chosen the wrong side of the argument, even though it is perfectly clear that he is here debating a matter in which he found some real difference of opinion among his sources. Let us therefore order a review of the case and see if errors of fact and of method do not exist in sufficient numbers to justify grave doubts as to the correctness of his conclusions.

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[1] *A.J.A.* XXII, 1918, pp. 434 ff.

We notice first of all that, in his discussion of the theory he rejects, Vitruvius assumes that the frieze developed in the peripteral temple or, at least, that it was used constructionally in it. In this he shows his fallibility, for we now know that buildings of the type which, in all probability, gave rise to the Greek temple existed at Troy and perhaps at Dimini and Sesklo some 1500 to 2000 years before the first peripteral temple.

It would simplify matters for us if we knew just what our author is attempting to translate from his Greek sources by *fenestrarum imagines.* He apparently uses *fenestra* in a literal sense as "a permanent opening to admit light," for only a real opening of some sort would justify his argument as to the weakening of the corners; and we may at once concede our approval of his conclusion that, in the finished building the frieze was never left open.[1] But the word he found may not have meant a permanent opening, although Guadet and Holland take it so and proceed to the reconstruction of an elaborate open frieze in which the roof is supported on pillars, the later triglyphs.[2] It seems on the whole simpler to assume that some of the authors on whom Vitruvius draws asserted that the metopes represented the beam ends and that in consequence the triglyphs must have been "spaces" (κενά, ὀπαί, παραθυρίδια). Such an expression need not have meant that the spaces were functional, but Vitruvius evidently so understood and he chose the very best word to convey his meaning. It is true that we have no contemporary examples of ὀπαί in the sense of "*fenestrae*," but the word is so used in the days of Constantine and these are in no case ordinary windows.

Another possibility to be reckoned with is that the term is merely a late deduction from the word μετόπη, for one might argue that if a μετόπη is a "surface between openings," the triglyphs must represent the openings. This leads, of course, to the possibility that the "*nonnulli*" were nothing more than etymologists of the type of Varro. Some importance attaches to this possibility by reason of the esteem in which Varro was held by Vitruvius and by the fondness of the age for such explanations.

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[1] Cf. Noack, *Jb. Kl. Alt.* I, 1898, pp. 656 ff.

[2] They assume that the τριγλύφους of the source had reference to the whole frieze, as in *Bacchae* 1214.

Vitruvius argues that triglyphs cannot represent openings because they come at the corner of a building and, in that case, there could be no "joints" at that point. Aside from the fact that one cannot argue origins from peripteral temples, it is somewhat surprising that our author, who is so fond of citing parallels, should have overlooked the obvious parallel of the Ionic dentils. What he apparently does is to assume that in every case the opening must go clear through the frieze. There is, nevertheless, an *intervallum* if not a *fenestra* at the corner of the Ionic moulding, and some such solution as the Ionic architect devised for turning the corner, when he did face the construction of the peripteral temple, must have been adopted for that purpose in the Doric frieze. Since, however, in our earliest extant remains the frieze is purely decorative and no longer constructional, we have to reckon with the fact that it may never have been more than decorative in any stone example.

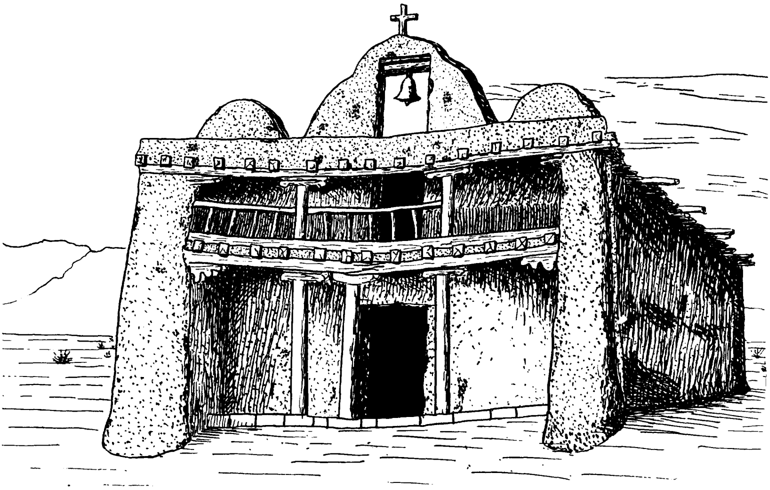

FIGURE 1.—CHURCH IN COCHITI PUEBLO.

In connection with the primitive temple, attention is called to the accompanying drawing (Fig. 1) of the Spanish-Indian church in Cochiti Pueblo, New Mexico. Save for its balcony and its round turrets this church represents far better than the well-known "Peasant's House in Persia" of Dieulafoy the probable appearance of the primitive megaron of sun-dried brick and wood. It will be seen that the beams of the portico of the church do not come at the corners, but at those points are "voids" filled with clay. Still, no one would be likely to call this construction weak.

The second item which Vitruvius adduces against our theory has to do with the placing of the triglyph directly over the centre of its supporting column (*contra tetrantes columnarum*). Our illustration may again serve to show how this is possible for, although there are five columns in the Cochiti façade, in no instance does a ceiling beam centre with a column; in fact, in three of the five examples, a "void" appears above the column.

The final argument of Vitruvius is somewhat more complicated: he tells us that the Greeks called the beds of timbers and of beams ὀπάς, for which the Latin equivalent is *columbaria*. The filling (*intertignium*) they called μετόπας, and this is true of both the Doric frieze and the Ionic dentils. In regard to the latter he observes that the theory he combats would make openings of the *denticuli*. Vitruvius is not altogether consistent in his use of terms, for he first says that the spaces (*intervalla*) between the dentils are called *metopae* and then it is the filling between the dentils (*intertignium*) which receives that name, while in III, 5, 11 he uses *intersectio* of the same element in the moulding. It would be superfluous to introduce an argument to show that a void cannot be referred to in Greek as a μετόπη, although it would be easy to find many recent examples of the barbarism. It is probably true that the face of the filling did receive that name, so that *intertignium* is the correct Latin equivalent.[1] But it does not follow that openings are necessary in order to have a facing, even with the word μετόπη.

A good example of what I have in mind is the μέτωπον of classical writers and architects. This word, if it means "space above the eyes," "forehead," is evidently a compound derived from μετά and ὤψ, but it is used, without implication of eyes, of the face of a wall (Thuc. III. 21); of the exposed surface of the riser in a stairway ('Εφ. 'Αρχ. 1900, p. 94, line 47); of the face of a pyramid (Herodotus, II. 124). Now in the famous arsenal of Philon we have a μέτωπον which has a doorway on either side,[2] but the doorway is not necessary to the term,[1] although we might so infer had we only the last cited instance of it. It is in this sense of "facing" that I understand μετόπη used of the filling between the dentils of the Ionic moulding.[2] We are unfortunate in that the word is found only in the *De Architectura*, and that we are deprived of means of verifying Vitruvius' use of it, as we are of knowing what other shades of meaning it may have had.

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[1] The definition of *intertignium* as a "space between beams" in Harper's Dictionary is incorrect, for the word cannot mean a "space" or "void" in this, the only passage cited, "*quod inter duas opas est intértignium.*"

[2] Caskey and Hill, *A.J.A.* XII, 1908, p. 192, err in deriving μέτωπον = "the space between the eyes" from μετά, ὀπή, and they force the Greek too far in

But we are not reduced to conjecture to show that our author's explanation is untenable: it forces us to believe that the metope got its name only when the frieze came to be made of stone, for surely no one would think that in simple construction of sun-dried brick and wood the filling was put in place upon the architrave before the ceiling beams were laid. Doerpfeld has shown that the names of other details of the temple, such as πλίνθοι and ὀρθοστάται, originated with the humblest materials. Is it then likely that the metope was rechristened when stone supplanted wood and when the triglyph frieze had become purely decorative? Indeed, at this time the ceiling beams were placed at a higher level than the frieze; there were no longer ὀπαί out of which μετόπαι could be made.

If "metope" means a filling between openings it must be a name growing out of a purely temporary condition in the process of temple construction. Once the frieze was done we should have in the word the best possible example of a *lucus a non lucendo,* as Keil has so aptly suggested.[3]

It may not be out of place at this point to call attention to the fact that should we, in spite of all these difficulties, adhere to Vitruvius' explanation, we must give up Winckelmann's theory of the open frieze based on *Iphigenia Taurica* 113 f. It is my belief that both views are wrong but, at any rate, we cannot have them both, for one excludes the other.

insisting that τὰ μέτωπα (1.59) must include the walls marked M′ M″ in their figure 3. Cf. Keil, *Hermes*, XIX, 1884, pp. 159 ff. It may be possible that the use of the term μέτωπον in military matters influenced the connotation of the word even in architecture. If εἰς μέτωπον στῆναι (Xen. *Cyr.* II, 4, 2–4) means "to stand in line" may not the *metopon* of the arsenal have received its name because it was to stand in line with the main walls?

[1] In spite of Ebert, *Fachausdrücke des griechischen Bauhandwerks*, p. 30.

[2] The best authenticated term for our "metope" is neither μέτωπον nor μετόπη but μετόπιον (*I.G.* II, 1054b, p. 227, 31, 39; cf. also Hesychius, *s.v.* μεθόπιον).

[3] *Hermes*, XIX, 1884, p. 159, note 2.

Of modern theories regarding the origin of the Doric frieze nearly all assume that the triglyph is sheathing for an original beam end. Chipiez[1] based his reconstruction largely on an alabaster slab which was discovered many years ago in Tiryns. Since, however, Frickenhaus has shown[2] that the slab had nothing to do with any part of the superstructure, this attempt need not detain us.

Another reconstruction is that of von Reber,[3] which is reproduced herewith (Fig. 2). It assumes a pitched roof, ceiling beams all running across the building in the same direction, and rather useless duplication of beams in the epistyle. Von Reber also makes use of the alabaster slab of Tiryns as an element in the construction of the triglyph. The spaces between the ceiling beams he leaves open to supply light to the interior of the building.

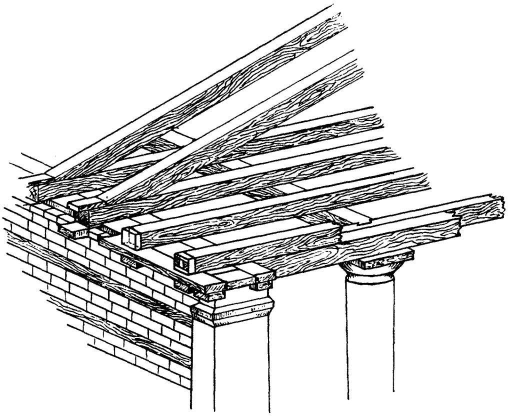

FIGURE 2.—ORIGIN OF HE DORIC FRIEZE: VON REBER.

There are numerous interesting items in Choisy's reconstruction (Fig. 3).[4] In it the frieze is apparently developed along the side of the peripteral temple, since the drawing shows a column and, above it, a pitched roof. On the architrave are placed at intervals transverse planks that project both at front and rear;

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[1] Perrot and Chipiez, *Art in Primitive Greece,* II, pp. 146 ff.

[2] *Tiryns* I, p. 37.

[3] *Abh. bayr. Akad.* Hist. Cl., XXI, 1898, pp. 475 ff.

[4] *Histoire de l'architecture,* I, pp. 287 ff. I know this reconstruction only at second hand.

then come the heavy ceiling beams, resting upon the planks. The beams are faced with slabs, the trigylphs, which are held in place at the top by mortises cut in a heavy beam that parallels the architrave, while at the bottom they are pegged through the planks. The rafters are heavy planks which are set fairly close and are joined on the under side by short, transverse pieces that later become the mutules. Questionable in this reconstruction are: (1) the planks on which the ceiling beams rest, since they serve so far as one can see, only to motivate the triglyphs, regulae, and guttae, and have no real constructional purpose; even in a wall of sun-dried brick such pieces would serve no useful purpose, as would a continuous plank running with the wall and distributing the weight of the roof evenly upon its top; (2) there is no justification for facing the ends of the ceiling beams; (3) the reconstruction fails to account for taeniae above and below the frieze and for the abacus of metopes and triglyphs; and finally (4) the use of material is, as has been pointed out, extravagant for the purpose illustrated.

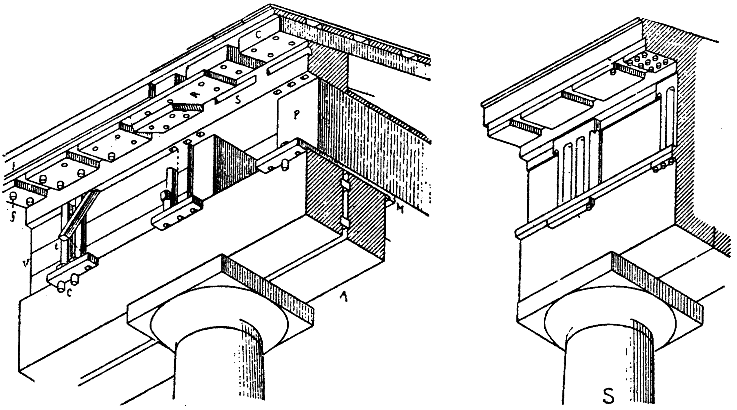

FIGURE 3.—THE PRIMITIVE DORIC ENTABLATURE: CHOISY.

Guadet's reconstruction[1] is so arbitrary and fanciful as to need little comment. It is based on the pitched roof and develops the triglyph, not from a ceiling beam, but from short posts which resemble a portion of a child's outfit of building blocks.

[1] *Éléments et théorie de l'architecture,* I, pp. 342 ff. Cf. *A.J.A.* XXI, 1917, p. 140, Fig. 9.

The frieze is left open, and nearly all its details, as also those of the cornice, appear as pure ornament rather than as organic parts of the construction.

Holland,[1] after showing that we are not to seek the details of the frieze in Minoan-Mycenaean construction, endeavors by a painstaking study of the proportions of extant early Doric buildings to derive the frieze from a combination of small pieces of wood and sun-dried brick. The result is ingenious but not convincing. He has failed to take account of the finds in Troy, Dimini, and Sesklo, and overlooks the invaluable work of Noack cited below. Furthermore, the construction appears unsound in that the slender piers of sun-dried brick which form the triglyphs would be unable to bear the weight that is laid upon them, especially in a land of earthquakes which were violent enough to throw down even sturdy buildings of stone;[2] and, finally, it develops the frieze along the side of the building where it almost never appears in the non-peripteral temple.

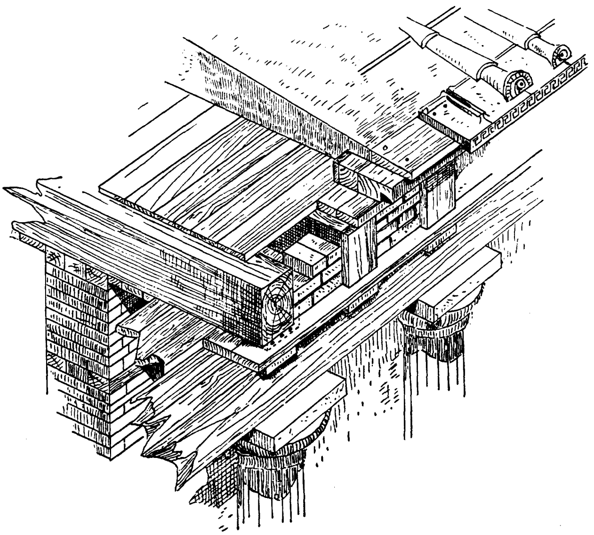

FIGURE 4.—ORIGIN OF THE DORIC FRIEZE: DURM.

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[1] *A.J.A.* XXI, 1917, pp. 117–158, Plate VII.

[2] It is true that construction somewhat like that which Holland proposes was in use in the walls of Athens (cf. Caskey, *A.J.A.* XIV, 1910, pp. 298–309) but the size of the supporting piers of the walls is unknown and, in any case, the span covered by the roof need not have been more than ten feet.

Durm,[1] basing his work on Vitruvius, the vase paintings, and the necessities of construction, has given us a valuable conception of a primitive temple (Fig. 4). He is commendably cautious, but fails to explain how it happens that we have no tiles from these primitive buildings, or why it should be necessary to face the beam ends. Nevertheless, his work commands our respect and, granted that Vitruvius is right and the vase paintings trustworthy, it is about as satisfactory as we can find among the more conservative writers.

Most satisfactory of all suggested reconstructions is, however, that of Noack.[2] After commenting on von Reber's proposals, Noack presents us with an illustration of his own reconstruction (Fig. 5). He assumes, first of all, a flat roof of clay, which is necessary to justify the large dimensions of triglyphs and metopes. The beams of the façade he places parallel to the long axis of the building, thereby removing certain complications in von Reber's work. As facing for the beam ends to produce the triglyph he uses a modified form of the alabaster slab already mentioned, stating, however, that the slab was not the original facing, but itself copied from an earlier form in wood. The facing is held in place at the bottom by pegs driven through a regula and a plank that serves as motive for the later taenia. A mortised plank resting along the top of the ceiling beam explains the upper border of the triglyph. The general conception of place of development, flat roof, and dimensions of parts is correct. Noack fails to justify the facing of beam ends

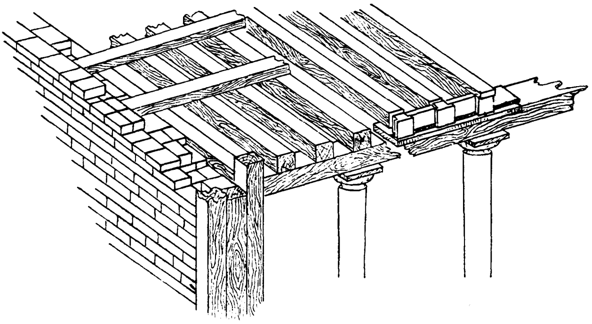

FIGURE 5.—ORIGIN OF THE DORIC FRIEZE: NOACK.

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[1] *Baukunst der Griechen,*[3] p. 375.

[2] *Jb. kl. Alt.* I, 1898, pp. 654–668.

and he gives no theory of development of the cornice, but his work is throughly done and clearly and convincingly stated.

It is now time to inquire whether it may not be possible to suggest a reconstruction which will obviate the difficulties of previous attempts and, at the same time, give due credit to the sources on which reconstructions must be based as well as to the necessities of the technique of sun-dried brick and wood. It will not be possible to settle definitely the question of flat roof versus pitched roof, although the finds in Troy II, the absence of early roof tiles, and the presence of a horizontal as well as a raking cornice in historic architecture are strong evidence in favor of the former. The vase paintings, *et dona ferentes*, are contradictory and, in the nature of things, sketchy and altogether untrustworthy as regards detail. Vitruvius, who lived in the Age of Augustus, must not be overlooked but, in view of his distance from the beginnings as well as of the methods of research practised in his time as against the careful studies that have, in our own day, been made of the extant remains, it will not be justifiable to look upon him as an oracle or, in fact, to give him more credence than is due a conscientious modern authority. Vitruvius undoubtedly had some sources that fail us, but no one, probably, ever wrote a history of architecture before the fourth century B.C. Aside from that, a man is not infallible simply because it was 2,000 years ago when he took sides in an argument in which we are interested.

An attempt will be made to do away with the unnecessary facing of beam ends and with the breaking up of one panel, the beam end, only to immediately construct a similar one beside it. Our reconstruction also makes it clear why, in historic times, the triglyph was gradually narrowed at the expense of the metope. All the ornament of the historic entablature will be accounted for on constructional grounds, although it would be foolish to insist that in a matter which must needs be so largely speculative there are no errors of detail.

We may begin our proposed reconstruction by assuming an embryonic stage in which our building was of the type of the church in Cochiti Pueblo (Fig. 1). This church is built of sun-dried brick and wood, and has a flat roof of clay supported by heavy beams which extend from side wall to side wall, both ends being in plain view from without. In a new building of this type the beam ends are flush with the face of the wall; they are cut square off and are not supplied with any sheathing. To cover the portico, however, the roof beams are laid parallel to the long axis of the church. They are supported in the façade by an architrave, which runs from wall to wall and is further held up by two columns *in antis* (the third column in our illustration being added to remedy a break). Upon the roof beams and at right angles to them smaller timbers of wood are laid in close order, as is shown in the drawing of the interior of a similar church at

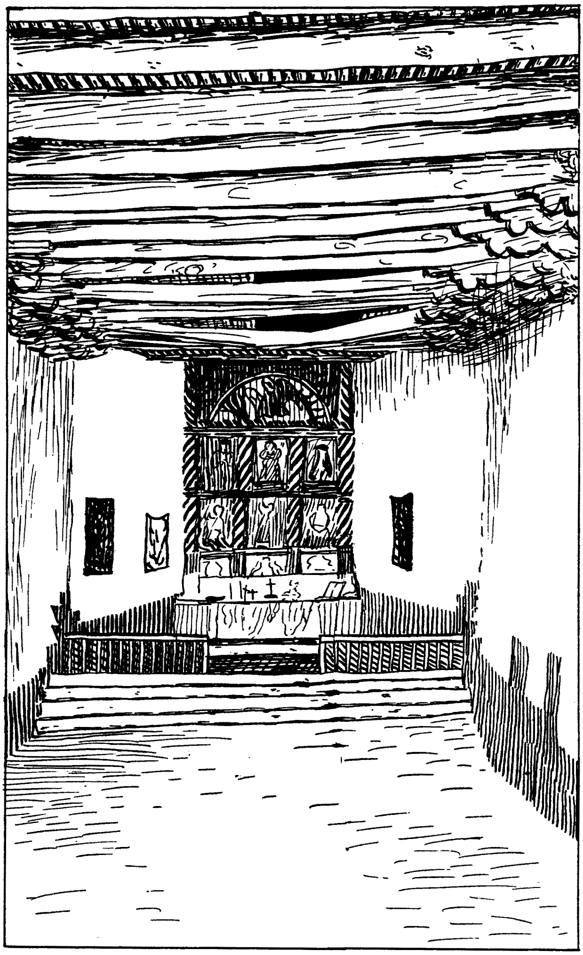

FIGURE 6.—CHURCH IN ACOMA PUEBLO.

Acoma Pueblo (Fig. 6). Next above the ancient Greeks may have placed a bed of reeds, straw, or the like; such a bed would help protect the timbers from moisture and decay, and would, further, make an even coating for the heavy layer of clay which topped the whole.

Now there is a serious drawback to a roof of the type described, and it is not that it demands constant attention and repair, for it is a simple matter to carry up a few buckets of clay after a heavy rain to replace what has inevitably washed away, just as it is no hardship to repair in a similar way the washing of the side walls;[1] but even the heaviest and firmest roof beams draw moisture from the walls in which they are bedded and inevitably decay. When this occurs the necessity arises of removing all the roof and replacing the beams with others, or of building over the roof and one lateral wall so as to make use of the sounder portions of the beams. This latter solution necessitates a reduction in the width of the church, but our illustration of the Cochiti church shows that it is one which is actually adopted. In fact we may see in it a possible explanation of the change in Greece from walls constructed of sun-dried brick to walls constructed throughout of stone.

If such be the case, the old temple at Tiryns, whose scanty remains Frickenhaus has so admirably published,[2] may assume great importance in the history of architecture. We can now account for the shifting of its longitudinal axis so far to one side (Fig. 7), for at least the foundation along the east side of the megaron could be utilized in the new building and possibly some of the ceiling beams could be used again. Frickenhaus seems to imply that the later temple had no interior columns supporting the roof, but the evidence for the reconstruction of everything save the plan is very slender and uncertain. It is, however, surprising that two columns of the cella as well as one of the façade of the old megaron should be found precisely in the axis of the building. The walls of the later temple are thought to be too frail to support a flat roof, and this is probably true if there were no interior supports, but these walls were two feet thick and presumably of stone, so that with the help of interior columns they would do very nicely. If the building had a continuous history of several centuries, the fragments of terra-cotta and the stone capital, which was found near by, may well be assigned to a still later restoration when a pitched roof was employed.

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[1] The pleasing, rounded contours of the new building of the School of American Archaeology at Santa Fe are said to be due to imitation of Spanish-Indian construction of the neighborhood, and to go back ultimately to the effect produced by years of weathering of the adobe coupled with years of continued repair. The repairs are conducted largely or altogether by women, who apply the soft adobe by hand to such cracks and crevices as have developed in the roof and walls. A good deal of the material falls to the ground and piles up there, but the rain is, of course, responsible for the rounding of roof edges and piers.

[2] *Tiryns* I, pp. 2–13.

Should the above surmise not seem too hazardous we may assume that interior columns, such as are indicated for the temple

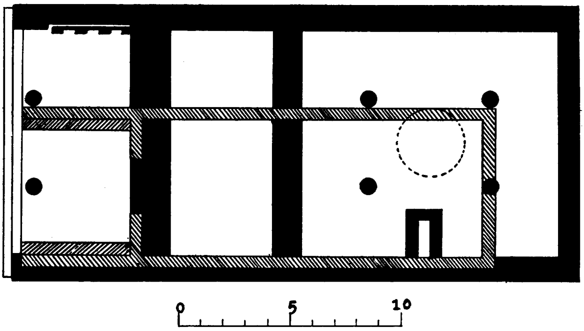

Figure 7.—Plan of Megaron and Temple: Tiryns.

of Artemis Orthia at Sparta and the temple in Thermos, are evidence for a flat roof of clay, rather than for a pitched roof of wood and tile. The change from a double row of columns to a single row would be easily accounted for, since in every case where the single row occurs the narrowness of the building is marked. I cannot believe that the Greek architect was so helpless as to resort to interior columns to support the peak of his pitched roof, unless the columns were already in position when he began his remodeling.

We have seen that the greatest defect in a flat roof of the New Mexican type lies in the certainty of unventilated beams decaying at the ends where they rest in the wall. The climate of Greece differs but slightly from that of our southwest and the tendency to decay is presumably about the same in both countries. To avoid this I assume that the Greek architect sought to ventilate his beams and timbers, and make my proposed reconstruction of the prehistoric megaron-temple as illustrated in the accompanying drawing (Fig. 8). What is represented is a portion of the anterior façade of such a building. The architrave rests upon the walls and upon columns. Next comes planking upon which rest the heavy ceiling beams, or, if one prefers, a rail, pegged fast to the upper edge of the architrave.[1] This planking or rail is represented in later stone construction by the taenia; the ends of the ceiling beams become metopes. Above the beams, and projecting slightly, is one of two or more narrow planks, the edge of which supplies the ground for a maeander band in later periods. Then comes a series of transverse pieces projecting sufficiently to protect the façade from the drip and tilted forward for the same purpose. The whole is surmounted by a heavy beam which runs along the edge of the roof and serves to keep in place the

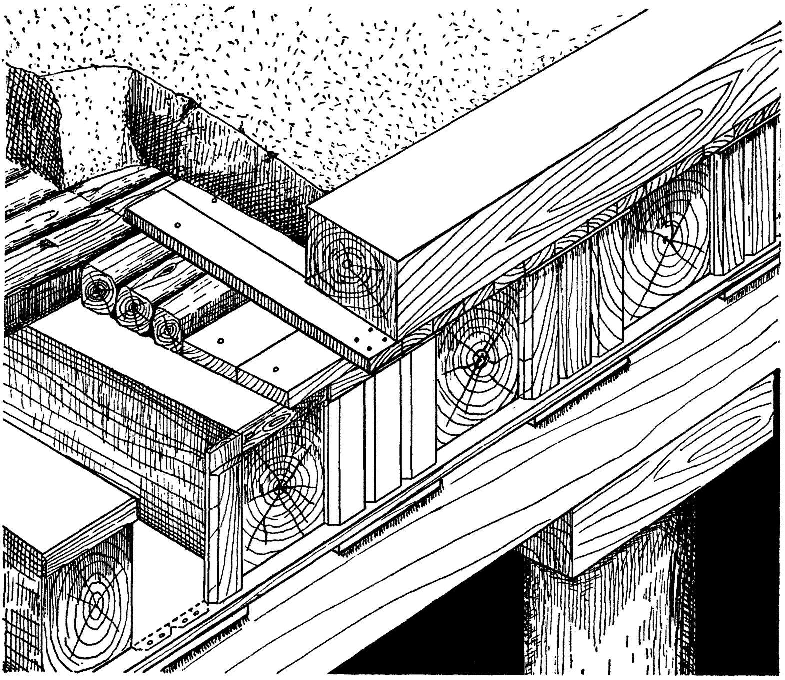

FIGURE 8.—ORIGIN OF THE DORIC FRIEZE: BEAM-ENDS AS METOPES.

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[1] Holland's remarks (*l.c.* p. 147) on the difficulty of producing planks in antiquity seem to be thoroughly sound.

thick bed of clay at its back. To prevent this ridge beam from being crowded out of place it is pegged securely from below, the heads of the pegs being the prototype of the historic guttae, just as the planks through which the pegs pass reappear as mutules. To fill the spaces between the ceiling beams the builder employed for each space three pieces of wood with chamfered edges, forming the triglyph. The triglyph is no longer a useless covering for the beam end, but even in its details it shows a constructional purpose, for it is made in three pieces rather than in one in order to prevent its warping and because such pieces are far easier to produce than a single broad member would be. A notch at the top of each slab receives the decorative band, as is shown in the lower, left-hand example. This band may have originally passed across a similar band upon the metope, in which case the upper end of the triglyph slabs could easily be fastened to it. Just as simple a way would be to make the band for both triglyphs and metopes of a single, properly mortised, and continuous piece. The lower ends of the triglyph were fastened through the regulae and taenia from below, the heads of the pegs appearing as guttae. The reason for six of these beneath each triglyph is at once apparent.

Objection may be raised to the size of the ceiling beams in our conjectural restoration, and to one who is not familar with the flat roof they do seem unreasonable. But when one realizes that such beams must sometimes carry twenty or twenty-five inches of clay, the necessity of strength begins to be realized. It will not do for those who believe in the triglyph as representing the end of the ceiling beam to raise this objection, however, since it is a disputed question whether metope or triglyph was wider in the primitive building, the evidence inclining even toward the triglyph, for as one traces proportions of triglyph and metope backward from the fourth century temple in Epidaurus to the sixth century temple D in Selinus he finds them change from 11:16 to 14:16. How much farther need one go to find them equal? Holland (*l.c.* p. 146) deduces the width of the triglyphs in the Heraeum to have been 0.77 m. on centres of 1.50 m.,—that is to say they may have been even larger than the metopes. In the early vase paintings the two members appear of about equal width.

The changes required in adapting the entablature to stone were few and slight. Although in the earlier periods there was no regularity in centring beam ends or "voids" above the columns, it now becomes the rule, for aesthetic and other reasons, to place the triglyph above columns and in the centres of intercolumniations. That exceptions were made is suggested by the vases and proved by the early round building in Delphi.[2] The triglyph was set back slightly and became somewhat narrower as time went on, for, with the abandonment of the triglyph and metope as constructional parts of the building, the architect was free to change their proportions, and this he would be led to do by the fact that, to the eye, the triglyph "picks up" the vertical lines of the column which were interrupted by the horizontal lines of the architrave. Now there are much larger spaces occupied by the intercolumniations than by the columns, and to match these proportions the metopes must be broadened at the expense of the triglyphs. It is not surprising that this change came, but that it came so slowly. The mutules also were spaced and their guttae increased in number, and, finally, the introduction of a pitched roof of tile gave a different appearance to the upper edge of the cornice.

The frieze was developed in our reconstruction on the façade of a *templum in antis*. Similar construction may have been employed along the sides of the cella, although it seems more likely that only the heads of the beams appeared there or a continuous sheathing of beam ends and spaces. It is known that in historic buildings of stone the ceiling beams always came at a higher level than the frieze. This was because the invention of roof tile and the introduction of the pitched roof made it possible to save material and labor by placing them on the wall rather than in it. The reason for this change has not heretofore been sufficiently emphasized.

The peripteral temple was probably a later development than the pitched roof; it need not have been much later, but that it came after it rather than before it is indicated by the negative evidence of its absence from Mycenaean construction, by the presence of a frieze in the pteron of peripteral temples, and by the difficulties of spacing the triglyphs with regard to the corner columns. Had the frieze been truly constructional in the peripteral building the inconsistences of spacing, while just as marked, would not have been so keenly felt. The same argument may be used with regard to a flat-roofed building to indicate that the

[1] Laum, *Jb. Kl. Alt.* XXIX, 1912, p. 638, note 1.

frieze did not develop on all sides of the building at once but at most on but two opposite faces.

The difficulties of adapting the Doric frieze to peripteral temples ended with the general abandonment of the order in such buildings. Had the difficulties existed from the beginning, we may be sure that the type of frieze we know would not have come into being.

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